



International Journal of Educational Methodology

Volume 8, Issue 1, 117 - 127.

ISSN: 2469-9632

<https://www.ijem.com/>

Investigating Problem-Solving Skills of Students Having Professional Music Training in Terms of Multiple Variables

Şenol Afacan^{*} 

Kırşehir Ahi Evran University, TURKEY

Emin Erdem Kaya^{*} 

Nevşehir Hacı Bektaş Veli University, TURKEY

Received: October 19, 2021 • Revised: December 2, 2021 • Accepted: February 4, 2022

Abstract: The present study aims to investigate the problem-solving skills of the students getting professional music training. For this study, the problem-solving inventory was administered to participants from two different universities in Turkey. Participants' problem-solving skills were assessed in relation to the overall inventory and subscales, and the differences based on grade level, gender, and universities were examined using Statistical Package for the Social Sciences (SPSS). Results revealed that participants occasionally used their problem-solving skills, rarely felt confident in their problem-solving skills, and occasionally performed the behaviors in the subscales of approach-avoidance and personal control. The grade level differentiated music students' problem-solving skills in the overall scale and approach-avoidance subscale. It is also found that there are no significant differences in students' problem-solving skills based on gender. However, the participants' universities led to significant differences in the approach-avoidance subscale. The results were discussed considering the literature, and the recommendations were suggested due to the results.

Keywords: Music, music education, problem-solving skill.

To cite this article: Afacan, Ş., & Kaya, E. E. (2022). Investigating problem-solving skills of students having professional music training in terms of multiple variables. *International Journal of Educational Methodology*, 8(1), 117-127. <https://doi.org/10.12973/ijem.8.1.117>

Introduction

Individuals constantly face different problems span of their lives and seek ways to solve these problems. The concept of problem, of course, includes not only mathematics or science; it consists of all situations encountered in every moment of the daily world and poses an obstacle to the person. When the literature is examined, different definitions of the problem are seen. For example, while Bingham (1998) defines the problem as all the obstacles an individual faces while reaching their goal, Morgan (1999) describes the problem as the conflict that a person encounters to reach their goal. According to Karasar (2009), each difficulty to be solved represents a problem in itself, and the person feels cognitively and behaviorally uncomfortable and needs to overcome it. To eliminate this discomfort or cope with this situation, the individual seeks various ways, makes decisions, or develops strategies. The ability to get results in this process is directly related to the individual's problem-solving skills. In other words, Bingham (1998) describes problem-solving as the process of overcoming the difficulties encountered in reaching a goal and points out that individual look for ways to get rid of stress and bring the organism to an internal balance by complying with conditions or reducing obstacles. According to Elliott and Baker (2008) "problem-solving is one approach to teaching and learning which supports content-based learning along with a variety of other such skills as decision-making, time management and problem-solving".

Problem-solving requires searching for a rule, plan, or strategy that will help individuals reach their goals that are currently unreachable. During this investigation, the individual tests his problem-solving skills by seeking different and new solutions and benefiting from his previous experiences (Plotnik, 2009). In problem-solving students use their 'inner-talk' to solve a problem (Vialle et al., 2000).

According to Heppner and Baker (1997), there are various aspects of individuals' problem-solving skills that are important. These are;

* Corresponding author:

Şenol Afacan, Kırşehir Ahi Evran University Neşet Ertaş Faculty of Fine Arts, Turkey. ✉ senolafacan@gmail.com



- General coping patterns,
- Proficiency regarding defining the problem,
- Cognitive processes, and
- Appraisal of oneself as a problem-solver (as cited in Güçlü, 2003).

On the other hand, different theorists assume that the problem-solving process has certain stages. Clark and Starr organized the problem-solving stages by analyzing the thinking process of J. Dewey, one of the pioneers of cognitive theory, and summarized the process in six steps. These are;

1. Identifying the problem
2. Analyzing and determining the limits of the problem
3. Collecting data to solve the problem
4. Generating hypotheses
5. Testing hypotheses
6. Reaching the solution (Bilen, 1993).

Pretz et al. (2003) defined the problem-solving process as a cycle and stated seven stages of the problem-solving process as follows:

1. Identifying or diagnosing the problem,
2. Defining and expressing the problem mentally,
3. Developing a solution strategy,
4. Organizing information about the problem,
5. Allocating the mental and physical resources for solving the problem,
6. Observing one's progress in reaching his/her goals,
7. Evaluating the solution for certainty (as cited in Topoğlu & Topoğlu, 2020).

Even if the researchers address different problem-solving stages of the problem-solving process, it is worth noting that there are some common stages, such as defining the problem and developing or testing strategies. Individuals might go through different phases when solving problems; but this can only give some clues about how the individuals' problem-solving skills develop. Additionally, art education might promote individuals' problem-solving skills and creativity that can facilitate personal development since art education, with its cognitive, affective, or psychomotor aspects, give particular importance to problem-solving skills and creativity. Some national research concludes that art education promoted students' social skills (Barış, 2008), creative thinking skills (Köse, 2006; Uysal, 2005), psychomotor skills (Özçelebi, 2008), and positively affected the cognitive, affective and psychomotor skills (Eskioğlu, 2003; İşler, 2003; Türkyılmaz, 2008) in Turkey.

Individuals must keep their creativity, interpretation skills, and ability to produce original works at a high level in music, as in other branches of art. The process of composing or performing a concert is a problem that must be overcome for a composer and performer, respectively, making them feel uncomfortable. However, researchers who have approached this situation from different perspectives and conducted various studies have concluded that there is generally a positive relationship between music and problem-solving skills. For example, Norton et al. (2005) stated that the brain is built on extraordinary and highly specialized sensorimotor skills and that musical performance requires cognitive complexity and motor operations. Zatorre et al. (2007) state that musical performance is a natural human activity seen in all societies and is one of the human mind's most complex and cognitive challenges. They also mention that musical performance requires the accurate timing of several hierarchically arranged actions, unlike other sensory-motor activities. According to Hallam (2010), it expands the understanding that recent developments in brain studies might affect other activities of those who are actively engaged in music. The cerebral cortex self-regulates while engaged in different musical activities, then abilities in these areas can be transferred to activities in other areas with similar processes. Some abilities are automatically transferred unconsciously, while others require reflection on how they might be evaluated in the new situation. Research, which deals with musical performances within the neurophysiological perspective, mentions that different brain abilities develop in the process and that this has positive effects on the problem-solving skills of individuals. The present study aims to investigate music students' problem-solving skills with regard to multiple variables and sought to answer the following research questions:

1. What are the problem-solving skills of the students of the music department of the Faculty of Fine Arts (FAF)?
2. Do the problem-solving skills of the students of the music department of the Faculty of Fine Arts differ by grade level?
3. Do the problem-solving skills of the students of the music department of the Faculty of Fine Arts differ by gender?
4. Do the problem-solving skills of the students of the music department of the Faculty of Fine Arts differ by their university?

Methodology

Research Design

The research is in the nature of descriptive research and was carried out in the survey model. In this type of approach, the event of interest is a substance, individual, group, subject, etc. unit and state variables are tried to be described separately. Descriptive studies, current events, previous events and it aims to explain the interaction between situations, taking into account their relationship with the conditions. Survey models, on the other hand, are based on presenting the existing situation as it exists and with an objective approach (Büyükoztürk et al., 2009; Karasar, 2009).

Participants

Participants were selected based on purposeful sampling. The information about participants' gender, grade level, and universities are given in Table 1.

Table 1. The Background Information about Participants' Gender, Grade Level, and Universities

University	N	%	Gender				Grade Level							
			Male	%	Female	%	1	%	2	%	3	%	4	%
Kırşehir Ahi Evran University Neşet Ertaş FAF	72	31.2	40	17.3	32	13.8	19	8.2	21	9.1	17	7.4	15	6.5
Nevşehir Hacı Bektaş Veli University FAF	159	68.8	79	34.2	80	34.7	48	20.8	38	16.5	33	14.2	40	17.3
Total	231	100	119	51.5	112	48.5	67	29.0	59	25.6	50	21.6	55	23.8

The study group included a totally of 231 university students, of whom 67 were first grade ($n=67$, 29.0%), 59 were second grade ($n=59$, 25.6%), 50 were third grade ($n=50$, 21.6%), and 55 were fourth grade ($n=55$, 23.8), who were enrolled in Kırşehir Ahi Evran University Neşet Ertaş FAF Music Department ($n=72$) and Nevşehir Hacı Bektaş Veli University FAF Music and Performing Arts Department ($n=159$).

One hundred twelve participants were female (48.5%), and 119 were male (51.5). 72 university students were recruited from Kırşehir Ahi Evran University Neşet Ertaş FAF (31.2%) and 159 were enrolled in Nevşehir Hacı Bektaş Veli University FAF.

Data Collection Tools

The data collection tool consists of two sections. First section was the Personal Information Form, including background information such as gender, grade level, and university. The second section was the "Problem-Solving Inventory (PSI)" developed by Heppner and Petersen (1982) and was adapted into Turkish by Şahin et al. (1993). The scale used to assess FAF students' problem-solving skills consists of 35 items. The items were measured on a 6-point-Likert whose levels of agreements were "I always act like this (6)", "I very frequently act like this (5)", "I frequently act like this (4)", "I occasionally act like this (3)", "I rarely act like this (2)", and "I never act like this (1)". The positively and negatively-worded items lied randomly on the scale. The negatively-worded items (1, 2, 3, 4, 11, 13, 14, 15, 17, 21, 25, 26, 30, and 34) were reverse-coded. Three items (9, 22, 29) were control items; therefore, 32 were included in data analysis. The minimum score is 32, and the maximum is 192 for PSI. The scale has three factors; problem-solving confidence, approach-avoidance style, and personal control. Problem-solving confidence is related to individuals' self-confidence and self-belief when they perform actions to solve the problems they face and includes items 23, 24, 27, 33, 34, and 35. Approach-avoidance style refers to the individuals' reviews of their previous values and their tendency to either approach or avoid solving problems, and includes items 1, 2, 4, 6, 7, 8, 13, 15, 16, 17, 18, 20, 21, 28, 30, and 31. The last

subscale, personal control, refers to individuals controlling the situation, own feelings and behaviors and includes items 3, 14, 25, 26, and 32. Higher scores mean that respondents feel incompetent in problem-solving and lower scores mean that respondents feel more competent in problem-solving (Şahin et al., 1993).

Table 2. Scoring the Items in the Problem-Solving Inventory

Levels of agreement	Score range	Item values
Never	1.00-1.83	1
Rarely	1.84-2.67	2
Occasionally	2.68-3.51	3
Frequently	3.52-4.35	4
Very frequently	4.36-5.19	5
Always	5.20-6.00	6

CFA results revealed that the scale has three subscales. The first factor is “Problem-solving confidence” and has a Cronbach’s α of .85; the second factor is “Approach-avoidance style” and has a Cronbach’s α of .84; the third factor is “Personal control” and has a Cronbach’s α of .72. Researchers re-calculated the reliability coefficients of the subscales and the overall scale; the results are given in Table 3.

Table 3. Internal Consistency Coefficients of Subscales

Subscales	Cronbach’s Alpha	Number of items
Problem-solving confidence	.810	11
Approach-avoidance style	.726	16
Personal control	.615	5
The overall scale	.836	32

Table 3 indicates that the internal consistency coefficients of the subscales range between .615 and .810. The first factor “Problem-solving confidence” has a Cronbach’s α of .810; the second factor “Approach-avoidance style” has a Cronbach’s α of .726; the third factor “Personal control” has a Cronbach’s α of .615. And the reliability coefficient of the overall scale is .836, indicating that the scale is a highly reliable scale for the sampled students (Kayış, 2008).

Data Collection

Data was collected face-to-face by researchers from 231 university students enrolled in Kırşehir Ahi Evran University Neşet Ertaş FAF Music Department and Nevşehir Hacı Bektaş Veli University FAF Music and Performing Arts Department in Turkey. The instrument was administered to students in a paper-pencil environment, and participants were asked to fill out the complete instrument. The collected data was analyzed by researchers using the SPSS 15 package program.

Data Analysis

The normality of data was investigated before analyzing data. Therefore, the results of the Kolmogorov-Smirnov Test were examined (Table 4).

Table 4. Kolmogorov-Smirnov Test Results of the Problem-Solving Inventory

Subscales	M	SD	Kolmogorov-Smirnov	p
Problem-solving confidence	2.50	.83	1.117	.165
Approach-avoidance style	2.77	.66	1.083	.191
Personal control	3.22	.78	1.641	.190
The overall scale	2.74	.60	.942	.337

According to Table 4, the overall scale and its sub scales’ p-values are higher than .05, indicating that the data has a normal distribution. Therefore, parametric tests were used to analyze data. The significance level was determined as .05 for all analyses. Effect sizes were calculated using Cohen’s d for the significant differences in t-tests and eta-square (η^2) for the significant differences in One Way ANOVA tests. The benchmarks for interpreting the Cohen’s d were 0.2 as “small,” 0.5 as “medium,” and 0.8 as “large” (Green and Salkind as cited in Can, 2013). Additionally, the benchmarks for interpreting eta-square (η^2) were 0.01 as “small,” 0.06 as “medium,” and 0.14 as “large” (Büyüköztürk, 2003).

Results

Descriptive Statistics Results on the Problem-Solving Inventory and Sub-Factors of the Students of the Faculty of Fine Arts (GSF)

The descriptive statistics related to FAF students' scores on the problem-solving inventory and its subscales are given in Table 5. Table 5 shows the mean scores, standard deviation, and minimum and maximum scores for the problem-solving inventory and its sub-Factors.

Table 5. The Descriptive Statistics Related the Problem-Solving Inventory and Its Subscales

The Problem-solving Inventory and its subscales	M	SD	Minimum	Maximum
Problem-solving confidence	2.50	.834	1.00	5.36
Approach-avoidance style	2.77	.663	1.06	4.25
Personal control	3.22	.782	1.20	6.00
The overall scale	2.74	.602	1.22	4.22

Table 5 reveals that FAF students rarely perform the behaviors in the "problem-solving confidence" subscale (M=2.50) and occasionally perform the behaviors in the "approach-avoidance style" subscale (M=2.77) and "personal control" subscale (M=3.22). Students' mean score from the overall scale was 2.74; thus, students occasionally executed the behaviors on the overall scale.

Results Regarding the Mean Scores of FAF Students on the Problem-Solving Inventory and Its Subscales Based on "Grade Level"

The differences between the scores of the FAF students on the problem-solving inventory and its subscales based on grade level were investigated, performing single factor variance analysis for independent samples (One Way ANOVA).

The single factor variance analysis for independent samples (One Way ANOVA) that was used to reveal whether significant differences occur in students' scores of the problem-solving inventory and its subscales based on grade level are given in Table 6.

Table 6. One Way ANOVA Test Results Regarding the Scores on the Problem-Solving Inventory and Its Subscales Based on Grade Level

	Grade level	N	M	SD	F	p	Significant difference	Eta-square (η^2)
Problem-solving confidence	1	67	2.48	.79	1.144	.332		
	2	59	2.42	.92				
	3	50	2.42	.88				
	4	55	2.67	.72				
Approach-avoidance style	1	67	2.67	.72	3.462	.017*	4-1 4-3	0.043
	2	59	2.73	.67				
	3	50	2.66	.58				
	4	55	3.01	.59				
Personal control	1	67	3.17	.74	.910	.437		
	2	59	3.24	.85				
	3	50	3.13	.67				
	4	55	3.36	.83				
The overall scale	1	67	2.68	.63	2.869	.037*	4-3	0.036
	2	59	2.70	.60				
	3	50	2.65	.59				
	4	55	2.95	.53				

*p<.05

The results in Table 6 demonstrate that grade level differentiated the scores on the overall scale (F= 3.462, p<.05) and "approach-avoidance style" subscale (F= 2.869, p<.05). The homogeneity of variances was investigated to determine the appropriate test that helps to find the source of the significant differences. Levene's test results are in Table 7.

Table 7. Variance Homogeneity Test Results

	Levene's Statistics	df1	df2	Sig (p)
Problem-solving confidence	1.046	3	227	.373
Approach-avoidance style	3.012	3	227	.331
Personal control	1.472	3	227	.223
The overall scale	1.501	3	227	.215

As seen in Table 7, the variances of the subscales and the overall scale are homogenous ($p>.05$). Tukey test was utilized to find the source of the significant differences since the group variances are equal.

According to Tukey test results, there are significant differences between third and fourth-grade students in favor of fourth grades ($M= 3.01$) and between first and fourth-grade students in favor of fourth grades ($M=3.01$) in the "approach-avoidance style" subscale. It is possible to say that the grade level has a *small* effect on "approach-avoidance style," considering the calculated eta-square ($\eta^2=0.043$).

When it comes to the overall scale, there is a significant difference between third and fourth-grade students in favor of fourth-grades ($M =3.01$). The grade level has a *small* effect on the overall scale with an eta-square of 0.036.

Results Regarding the Mean Scores of FAF Students on the Problem-Solving Inventory and Its Subscales Based on "Gender"

Independent samples t-test was used to analyze the differences in the problem-solving inventory and its subscales based on gender. Table 8 indicates the results of the independent t-test performed to reveal whether there is or not a significant difference in the problem-solving inventory and its subscales based on gender.

Table 8. t-Test Results Regarding the Scores on the Problem-Solving Inventory and Its Subscales Based on Gender

	Gender	N	M	SD	df	t	p
Problem-solving confidence	Female	112	2.50	.81	229	.140	.888
	Male	119	2.49	.85			
Approach-avoidance style	Female	112	2.73	.67	229	.897	.371
	Male	119	2.80	.65			
Personal control	Female	112	3.17	.71	229	.925	.356
	Male	119	3.27	.84			
The overall scale	Female	112	2.72	.59	229	.614	.070
	Male	119	2.77	.61			

Gender did not lead to significant differences in the problem-solving inventory and its subscales [$t_{(229)} = .140$, $p>.05$; $t_{(229)} = .897$, $p>.05$; $t_{(229)} = .925$, $p>.05$; $t_{(229)} = .614$, $p>.05$].

Results Regarding the Mean Scores of FAF Students on the Problem-Solving Inventory and Its Subscales Based on "University"

Independent samples t-test was used to analyze the differences in the problem-solving inventory and its subscales based on participants' universities. Table 8 indicates the results of the independent t-test performed to reveal whether there is or not a significant difference in the problem-solving inventory and its subscales based on university.

Table 9. t-Test Results Regarding the Scores on the Problem-Solving Inventory and Its Subscales Based on University

	University	N	M	SD	df	t	p	Cohen's d
Problem-solving confidence	Kırşehir Ahi Evran University Neşet Ertaş FAF	72	2.47	.93	229	.269	.788	0.330
	Nevşehir Hacı Bektaş Veli University FAF	159	2.51	.78				
Approach-avoidance style	Kırşehir Ahi Evran University Neşet Ertaş FAF	72	2.61	.61	229	2.407	.017*	0.330
	Nevşehir Hacı Bektaş Veli University FAF	159	2.84	.73				
Personal control	Kırşehir Ahi Evran University Neşet Ertaş FAF	72	2.22	.85	229	.000	.999	
	Nevşehir Hacı Bektaş Veli University FAF	159	2.22	.75				
The overall scale	Kırşehir Ahi Evran University Neşet Ertaş FAF	72	2.66	.69	229	1.443	.150	
	Nevşehir Hacı Bektaş Veli University FAF	159	2.78	.55				

* $p<.05$

There is a significant difference between the scores of the Kırşehir Ahi Evran University Neşet Ertaş FAF students and Nevşehir Hacı Bektaş Veli University FAF students in favor of the Nevşehir Hacı Bektaş Veli University FAF students ($M=2.84$) in the “approach-avoidance style” subscale. The calculated Cohen’s d ($d=0.330$) indicates that the effect of the university on students’ approach-avoidance style has a *small* effect.

There were no significant differences between scores of the students from two different universities in the overall scale, “problem-solving confidence” subscale, and “personal control” subscale [$t_{(229)}=1.443$, $p>.05$; $t_{(229)}=.269$, $p>.05$; $t_{(229)}=.000$, $p>.05$].

Discussion

The present study primarily aims to investigate the problem-solving skills of university students who are getting professional music training. The results obtained from the data collection tool revealed that students occasionally used their problem-solving skills. Besides, it is seen that students rarely behaved like stated in the “problem-solving confidence” subscale and occasionally behaved like stated in “approach-avoidance style” and “personal control” subscales. Based on this result, it can be said that the problem-solving skills of the students of the faculty of fine arts are not sufficiently developed or that their problem-solving skills are not sufficiently developed. Sample problems that will improve their problem solving skills may not have been given to the students. At this point, it is of great importance to gain and develop problem-solving skills, which have an important effect on the development of academic success and self-efficacy perception in music education. Killen (2003) stated that one can learn problem solving. DeLorenzo (1989) found that high level problem solvers explore sounds for musical expression as aiding higher levels of musical thinking. In contrast, people with weak problem solvers relied on their musical anxieties to make decisions. In addition, students’ ability to see their problems can affect the problem solving process.

Ertekin (2017) found that preservice music teachers’ problem-solving skills are below the intermediate level and also concluded that there were no significant differences in the “problem-solving confidence,” “approach-avoidance style,” and “personal control” subscales based on various variables. Güven (2017) also used the same instrument and reported that the preservice music teachers in the study had negative perceptions about problem-solving skills. Yazıcı (2017) conducted a study with 90 preservice music teachers and stated that preservice teachers are successful in problem-solving. Altun (2015) found that the participant preservice music teachers had a high level of problem-solving skills. The differences in the results of these studies might stem from the differences in the sample sizes. Berkley (2004) considers composing as problem solving. In his study, Hitz (1987) stated that children’s creative problem-solving skills can be improved with musical activities such as various musical games, songs, writing lyrics for songs, and composing melodies. According to Burnard and Younker (2004), students should develop problem-solving strategies and ways that can help them examine their own way of composing, which is characterized by the nature and extent of interaction between different musical ways of thinking.

The mean scores of the students getting professional music training differed in the overall scale and “approach-avoidance style” subscale based on grade level. There were significant differences between the third and fourth-grade students and between the first and fourth-grade students in favor of fourth grades in the “approach-avoidance style” subscale. The effect size of the grade level on the approach-avoidance subscale was *small*. Besides, there was also a significant difference between the third and fourth-grade students in favor of the fourth grades on the overall scale, with a small effect size. Based on this information, it can be said that the increase in the class level also brings about an increase in the problem solving skills of the students. It can be said that students gain a more conscious, more questioning and critical perspective depending on their grade level. Although there is a significant difference in problem solving skills in favor of the 4th grade between grade levels, it is a result that should be considered that this difference has a low level of effect. Çeşit (2017) conducted a study with 162 preservice music teachers and investigated problem-solving styles based on grade level. It is seen that the scores of third-grade preservice teachers are lower than the second grades’ scores, and second-grade preservice teachers had a less avoid-style in problem-solving than the third-grades. It is not expected that lower grade students had higher scores than the higher-grade students, considering the increase in music training time with grade. Çevik (2011) found that students’ problem-solving skills differed based on grade level and the significant differences were in favor of the fourth grades. Kuzmich (1987) stated that creative problem solving in music education is included in students’ decision-making activities and provides feedback resources for students and teachers; allows multiple results; Thus, he stated that it reflects students’ needs, related fields and skills and increases learning.

In another study, Çevik and Özmaden (2013) did not find any significant differences in the students’ problem-solving skills based on grade level but reported that fourth grades had higher scores than other grades. Yıldız and Kurtuldu (2014) said that preservice music teachers’ problem-solving skills are above the intermediate level. Third-grade preservice teachers had higher levels of problem-solving than other grades, and the first, second, and fourth grades followed third grades, respectively. Topoğlu and Topoğlu (2020) did not find significant differences based on grade level. They perceived the reason for this result as the course structures and contents that the preservice music teachers take during their education are not processed to improve their problem-solving skills. According to Owens et al. (2001), Hair and Graziano (2003) people who have problem-solving skills; have a sense of self-confidence and the ability to

think creatively with an objective point of view and a musician who can think creatively can benefit from problem-solving skills in interpreting his instrument (as cited in Otacıoğlu, 2008).

The present study did not find any significant differences on the overall scale and in its sub-scales based on gender. The study of Güven (2017) with ten students revealed no significant differences on the overall scale, approach-avoidance style subscale, and personal control subscale. However, there was a significant difference in the problem-solving confidence subscale in favor of the male students. Similarly, Çevik and Özmaden (2013) reported no significant differences in participants' problem-solving skills based on gender. Topoğlu and Topoğlu (2020) found that there were no significant differences on the overall scale and sub-scales based on gender, and Yıldız and Kurtuldu (2014) concluded that students' problem-solving skills did not differ based on their genders. These results support the present study's findings regarding gender. That is, there is no connection between gender and problem solving. Abdellatif and Zaki (2021) concluded that no significance relationship between problem solving skills and gender. Dauda et al. (2019) in their study with a total of 3549 students, they did not find a significant difference between the problem solving skills of the students and their gender.

The results regarding the differences based on the universities of participants showed that there is a significant difference between Kırşehir Ahi Evran University Neşet Ertaş FAF students and Nevşehir Hacı Bektaş Veli University FAF students in "approach-avoidance style" subscale scores in favor of the Nevşehir Hacı Bektaş Veli University FAF students. The participants' universities had a small effect on their approach-avoidance style. Topoğlu and Topoğlu (2020) did not find any significant differences in preservice music teachers' problem-solving skills based on the participants' universities. Ertekin (2017) concluded that participants' universities did not impact their problem-solving skills. The results of these studies differ from the results of the research conducted. In terms of approach-avoidance subscale of the inventory, the university variable had a small effect on students' problem solving skills. According to De Almeida and Benevides (2018) the university recognizes situations in which the expression of positive opinions can facilitate students' interpersonal relationship, better their perception of reality and investment in the attempt to use practical rules/creative solutions for the problems, and their adaptation to university life. In this respect, Gomes and Benevides (2013) emphasize that undergraduate students face many academic and personal difficulties, and need to learn how to solve conflicting situations related to the university environment. It is worth noting that the significant difference in the approach-avoidance style subscale in the present study might be due to the application methods and contents of the courses taught in the universities or the students' academic achievements. Coulson and Burke (2013) stated that allowing students to produce solutions to musical problems improves their critical and creative thinking skills. Musical problems may be to write new music, add nuance to a piece, or analyze and evaluate their own performances. Creative thinking in music is motivated by a problem and a need for its solution. It is suggested to make further measurements based on different variables to investigate the differences in the participants' universities.

Conclusion

The present study examined the problem-solving skills of the students having professional music training on the overall problem-solving scale and its subscales based on gender, grade level, and participants' universities. The results indicated that students occasionally used their problem-solving skills, rarely felt confident about their problem-solving skills, and occasionally executed the actions stated in the approach-avoidance style and personal control subscales.

The significant differences based on grade level only occurred on the overall problem-solving scale and approach-avoidance subscale. There were no significant differences in problem-solving skills of the students having music education based on gender. Additionally, there was a significant difference in the approach-avoidance subscales in favor of the Nevşehir Hacı Bektaş Veli University FAF students. When the results in the literature were examined, it is seen that some of them support the results of the present study. Although these results are not generalizable, they need to be supported with qualitative studies.

Recommendations

The following recommendations are suggested based on the results of the study.

- a. Considering that the problem-solving skills of the music students having an applied education are lower than the expected level, it is necessary to add courses with authentic content that will promote students' problem-solving skills to the training programs.
- b. The present study consists of two universities and a limited number of students from these universities. Different results might be obtained from further research with a larger sample and various variables.
- c. Further qualitative, experimental, and mixed design research should be conducted to promote music students' problem-solving skills.
- d. Additional practices and studies that might advance music students' creative problem-solving and analytical thinking skills should be added to the curriculum.

Limitations

It is worth noting that this study has some limitations. Results are limited to data obtained from students enrolled in Kırşehir Ahi Evran University Neşet Ertaş Fine Arts Faculty Music Department and Nevşehir Hacı Bektaş University Fine Arts Faculty Music and Performing Arts Department. Increasing the sample size and differentiating the variables of interest might provide detailed findings. This study concludes the quantitative results using a relational survey design. It is possible to get impressive results by conducting a mixed-method design in which quantitative and qualitative methods are used together.

Authorship Contribution Statement

Afacan: Conceptualization, design, statistical analysis, writing, data acquisition, data analysis/ interpretation, critical revision of manuscript, supervision. Kaya: Conceptualization, design, writing, data acquisition, critical revision of manuscript, supervision.

References

- Abdellatif, M. S., & Zaki, M. A. (2021). Problem-solving skills as a mediator variable in the relationship between habits of mind and psychological hardness of university students. *International Journal of Higher Education*, 10(3), 88-99. <https://doi.org/10.5430/ijhe.v10n3p88>
- Altun, F. (2015). *Müzik öğretmeni adaylarının öğrenme stilleri, problem çözme becerileri ve alan başarı puanları arasındaki ilişkiler* [Music teacher candidates' learning styles, problem solving skills and the relationship between field achievement points] [Unpublished master's thesis]. İnönü University.
- Barış, A. D. (2008). Sosyal beceri gelişiminde çocuk ve müzik [Child and music in social skill development]. *Millî Eğitim Dergisi/ National Education Magazine*, 177, 28-35.
- Berkley, R. (2004). Teaching composing as creative problem solving: Conceptualising composing pedagogy. *British Journal of Music Education*, 21(3), 239-263. <https://doi.org/10.1017/S026505170400587X>
- Bilen, M. (1993). *Plandan uygulamaya öğretim* [Teaching from plan to practice]. Takav Publishing.
- Bingham, A. (1998). Çocuklarda problem çözme yeteneklerinin geliştirilmesi [Developing problem-solving skills in children]. (A. F. Oğuzkan, Trans.). MEB Publishing.
- Burnard, P., & Younker, B. A. (2004). Problem solving and creativity: Insights from students' individual composing pathways. *International Journal of Music Education*, 22(1), 59-76. <https://doi.org/10.1177/0255761404042375>
- Büyüköztürk, Ş. (2003). *Sosyal bilimler için veri analizi el kitabı* [Data analysis handbook for social sciences]. Pegem A Publishing.
- Büyüköztürk, Ş., Kılıç Çakmak, E., Akgün, Ö. E., Karadeniz, Ş., & Demirel, F. (2009). *Bilimsel araştırma yöntemleri* [Scientific research methods] (3th ed.). Pegem A Academy.
- Can, A. (2013). *SPSS ile bilimsel araştırma sürecinde nicel veri analizi* [Quantitative data analysis in scientific research process with SPSS]. Pegem Academy.
- Coulson, A. N., & Burke, B. M. (2013). Creativity in the elementary music classroom: A study of students' perceptions. *International Journal of Music Education*, 31(4), 428-441. <https://doi.org/10.1177/0255761413495760>
- Çeşit, C. (2017). Müzik öğretmenliği lisans programı öğrencilerinin sosyal problem çözme becerilerinin incelenmesi [Investigation of Social Problem Solving Skills of Undergraduate Students in Vocational Music Training]. *Afyon Kocatepe Üniversitesi Akademik Müzik Araştırmaları Dergisi/ Afyon Kocatepe University Journal of Academic Music Research*, 3(5), 6-22. <https://doi.org/10.5578/amrj.32184>
- Çevik, D. B. (2011). Müzik öğretmeni adaylarının çeşitli değişkenlere göre problem çözme becerileri [Problem solving skills of pre-service music teachers based on various variables]. *Kastamonu Journal of Education/ Kastamonu Eğitim Dergisi*, 19(3), 1003-1012. <https://bit.ly/3rzlgny>
- Çevik, D. B., & Özmaden, M. (2013). Öğretmen adaylarının problem çözme becerileri [Problem solving skills of preservice teachers]. *Journal of Research in Education and Teaching/ Eğitim ve Öğretim Araştırmaları Dergisi*, 2(3), 270-275. <https://bit.ly/3gnQZ1p>
- Dauda, H., Mu'az, A. T., & Labbo A. M. (2019). Cognitive style and problem solving as correlates of academic achievement among diploma students of Aminu Kano College of Islamic and legal studies, Kano. *KaJEP*, 1(1), 1-8. <https://bit.ly/34Do1lo>
- De Almeida, Z., & Benevides, A. (2018). Social skills, coping, resilience and problem-solving in psychology university students. *Liberabit*, 24(2), 265-276. <https://doi.org/10.24265/liberabit.2018.v24n2.07>

- DeLorenzo, L. C. (1989). A field study of sixth-grade students' creative music problem solving processes. *Journal of Research in Music Education*, 37(3), 188-200. <https://doi.org/10.2307/3344669>
- Elliott, S., & Baker, W. J. (2008, November 24-27). *Student perceptions of problem-solving in and through music in the senior primary classroom* [Paper presentation]. NZARE National Conference "Education in Change" at Massey University College of Education, Palmerston North, New Zealand.
- Ertekin, M. N. (2017). *Müzik öğretmenleri adaylarının öz-yeterlilik düzeylerinin problem çözme becerisi düzeylerine etkisi* [The effect of music teachers' self-efficacy levels on the level of problem solving ability] [Unpublished master's thesis]. Necmettin Erbakan University.
- Eskioğlu, I. (2003, October 30-31). *Müzik eğitiminin çocuk gelişimi üzerindeki etkileri* [The effects of music education on child development] [Paper presentation]. Cumhuriyetimizin 80. yılında müzik sempozyumu [Music symposium on the 80th anniversary of our republic], İnönü University, Malatya, Turkey.
- Gomes, G., & Benevides, A. (2013). Intelligence, social skills and academic expectations in university students' performance [Inteligência, habilidades sociais e expectativas acadêmicas no desempenho de estudantes universitários]. *Psychology: Research and Review/ Psicologia: Reflexão e Crítica*, 26(4), 780-789. <https://doi.org/10.1590/S0102-79722013000400019>
- Güçlü, N. (2003). Lise müdürlerinin problem çözme becerileri [Problem solving skills of high school principals]. *Milli Eğitim Dergisi /Journal of National Education*, 160, 272-300.
- Güven, E. (2017). Müzik öğretmeni adaylarının problem çözme becerilerinin piyano dersinde karşılaştıkları sorunların çözümüne olan etkilerinin incelenmesi [An investigation on the effects of problem solving skills of music teacher candidates' to the problems encountered in piano courses]. *Abant İzzet Baysal Üniversitesi Eğitim Fakültesi Dergisi*, 17(2), 737-756. <https://doi.org/10.17240/aibuefd.2017.17.30227-326595>
- Hair, E. C., & Graziano, W. G. (2003). Self-esteem, personality and achievement in high school: a prospective longitudinal study in Texas. *Journal of Personality*, 71(6), 971-994. <https://doi.org/10.1111/1467-6494.7106004>
- Hallam, S. (2010). The power of music: Its impact on the intellectual, social and personal development of children and young people. *International Journal of Music Education*, 28(3), 269-289. <https://doi.org/10.1177/0255761410370658>
- Heppner, P. P., & Petersen, C. H. (1982). The development and implications of a personal problem-solving inventory. *Journal of Counseling Psychology*, 29(1), 66-75. <https://doi.org/10.1037/0022-0167.29.1.66>
- Heppner, P. P., & Baker, C. E. (1997). Applications of the problem solving inventory. *Measurement and Evaluation in Counseling and Development*, 29(4), 229-241. <https://doi.org/10.1080/07481756.1997.12068907>
- Hitz, R. (1987). Creative problem solving through musical activities. *Young Children*, 42(2), 12-17. <https://www.jstor.org/stable/42725869>
- İşler, A. Ş. (2003). Okul öncesinde disiplin temelli sanat eğitiminin uygulanabilirliğinin kuramsal temelleri ve çocuk gelişimi açısından önemi [Theoretical foundations of the applicability of discipline-based art education in preschool and its importance in terms of child development]. *Atatürk University Journal of Kazım Karabekir Education Faculty/ Atatürk Üniversitesi Kazım Karabekir Eğitim Fakültesi Dergisi*, 8, 35-54. <https://bit.ly/3uqtjBQ>
- Karasar, N. (2009). *Bilimsel araştırma yöntemi: Kavramlar-ilkeler-teknikler* [Scientific research method: Concepts-principles-techniques]. Nobel Publishing.
- Kayış, A. (2008). *Güvenilirlik analizi* [Reliability analysis]. In Ş. Kalaycı (Ed.), *SPSS uygulamalı çok değişkenli istatistik teknikleri* [SPSS applied multivariate statistical techniques] (3th ed., pp. 403-419). Asil Publishing Distribution.
- Killen, R. (2003). *Effective teaching strategies: Lessons from research and practice* (3th ed.). Social Science Press.
- Köse, G. (2006). *İlköğretim kurumları resim-iş eğitimi programında yer alan baskı resim tekniklerinin yaratıcı kişilik oluşturmadaki yeri ve önemi* [The role and importance of print drawing techniques that take place at the primary education institutions drawing-work education program on the formation of creative personality] [Unpublished master's thesis]. Gazi University.
- Kuzmich, N. (1987). Research, problem-solving and music education. *British Journal of Music Education*, 4(3), 211-222. <https://doi.org/10.1017/S0265051700006045>
- Morgan, C. T. (1999). Psikolojiye giriş [Introduction to psychology] (S. Karakaş & R. Eski, Trans. Eds.). Eğitim Academy Publishing.
- Norton, A., Winner, E., Cronin, K., Overly, K., Lee, J. D., & Schlaug, G. (2005). Are there pre-existing neural, cognitive, or motoric markers for musical ability? *Brain and Cognition*, 59(2), 124-134. <https://doi.org/10.1016/j.bandc.2005.05.009>

- Otacıoğlu, S. G. (2008). Müzik eğitimi bölümü öğrencilerinin problem çözme, özgüven düzeyleri ile çalgı başarılarının karşılaştırılması [The relations between the music department undergraduates' levels of problem solving, self esteem and their successes in playing instruments]. *Journal of Ahmet Keleşoğlu Education Faculty/ Ahmet Keleşoğlu Eğitim Fakültesi Dergisi*, 26,143-154.
- Owens, T. J., Stryker, S., & Goodman, N. (Eds.). (2001). *Extending self-esteem theory and research: Sociological and Psychological Currents*. Cambridge University Press. <https://doi.org/10.1017/CBO9780511527739>
- Özçelebi, B. (2008). 5-6 yaş grubu piyano eğitimi gören ve piyano eğitimi görmeyen çocukların motor becerilerinin karşılaştırılması [Comparing the motor skills of the 5-6 year-old children who have received piano training and the 5-6 year-old children who have not received piano training] [Unpublished master's thesis]. Gazi University.
- Plotnik, R. (2009). *Psikolojiye giriş* [Introduction to psychology] (T. Geniş, Trans.). Kaknüs Publishing.
- Pretz, J. E., Naples, A. J., & Sternberg, R. J. (2003). Recognizing, defining, and representing problems. In J. Davidson, & R. Sternberg (Eds.), *The psychology of problem solving* (pp. 3-30). Cambridge University Press. <https://doi.org/10.1017/CBO9780511615771.002>
- Şahin, N., Şahin, N. H., & Heppner, P. P. (1993). Psychometric properties of the problem solving inventory. *Cognitive Therapy and Research*, 17(4), 379-396. <https://doi.org/10.1007/BF01177661>
- Topoğlu, O., & Topoğlu, E. E. (2020). Müzik öğretmeni adaylarının problem çözme becerilerine yönelik algılarının çeşitli değişkenler açısından incelenmesi [Investigating the perceptions of pre-service music teachers on problem solving skills in terms of various variables], *EKEV Akademi Dergisi*, 24(81), 329-342. <https://doi.org/10.17753/Ekev1308>
- Türkyılmaz, R. (2008). *İlköğretim okulları 2. kademe (6, 7, 8. sınıflar) görsel sanatlar dersinde soyut çalışmaların yeri* [The importance of abstract performances in visual arts lectures for 2nd degree elementary education (6,7,8. classes)] [Unpublished master's thesis]. Gazi University.
- Uysal, A. (2005). İlköğretimde verilen sanat eğitimi derslerinin yaratıcılığa etkileri [The effects of the art education courses in primary school on creativity]. *Ahi Evran Üniversitesi Kırşehir Eğitim Fakültesi Dergisi*, 6(1), 41-47. <https://bit.ly/3l6AK5h>
- Vialle, W., Lysaght, P., & Verenikina, I. (2000). *Handbook on childhood development*. Social Science Press.
- Yazıcı, T. (2017). Müzik öğretmeni adaylarının problem çözme ve sosyal becerileri [Problem solving and social skills levels of music teacher candidates]. *Kastamonu Journal of Education/ Kastamonu Eğitim Dergisi*, 25(1), 299-314. <https://doi.org/10.24106/kefdergi.309053>
- Yıldız, Y., & Kurtuldu, M. K. (2014). Müzik öğretmeni adaylarının problem çözme becerilerinin çeşitli değişkenlere göre incelenmesi: Karadeniz Teknik Üniversitesi örneği [A review on problem-solving skills of candidate music teachers according to the various variables: Example of Karadeniz Technical University]. *The Journal of Academic Social Science Studies*, 28, 525-535. <https://doi.org/10.9761/JASSS2520>
- Zatorre, J. R., Chen, L. J., & Penhune, B. V. (2007). When the brain plays music: Auditory-motor interactions in music perception and production. *Nature Reviews Neuroscience*, 8(7), 547-558. <https://doi.org/10.1038/nrn2152>